

Row Operations

Types of systems:

2D \mathbb{R}^2 :

- Non-parallel lines
- Identical lines
- Parallel lines

3D \mathbb{R}^3 :

- Unique solution
- Infinite number of solutions
- No solutions

Row operations:

- (Replacement/ Addition) Add a multiple of one row to another.
- (Interchange) Interchange two rows.
- (Scaling) Multiply a row by a non-zero scalar.

$$\begin{cases} x_1 - 2x_2 + x_3 = 0 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

$$\text{Row}_1 + \text{Row}_2$$

$$\begin{cases} x_1 - 7x_3 = 8 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

$$\text{Row}_2 / 2$$

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 5x_1 - 5x_3 = 10 \end{cases}$$

$$\text{Row}_3 - 5 \text{Row}_1$$

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 10x_2 - 10x_3 = 10 \end{cases}$$

****Note:** Row₁ represents the original Row₁ not the modified Row₁

Row₃ - 10 Row₂

$$\begin{cases} x_1 - 7x_3 = 8 \\ x_2 - 4x_3 = 4 \\ 30x_3 = -30 \end{cases}$$

$$x_3 = -1$$

Substiution

$$x_1 = 1$$

$$x_2 = 0$$